

First record of three gobiid species in the Levant

by

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RÉSUMÉ. - Premier signalement de trois espèces de gobies en mer Levantine.

Les spécimens de *Gobius couchi*, *Gobius fallax* et *Odondebuenia balearica* de l'île de Chypre, trouvés récemment dans la collection de poissons de l'Université hébraïque de Jérusalem, représentent le premier signalement de ces espèces au Levant. Ces découvertes fournissent des données sur la morphologie des spécimens levantins. L'identification de *Gobius fallax* est discutée.

Key words. - Gobiidae - *Gobius couchi* - *Gobius fallax* - *Odondebuenia balearica* - MED - Cyprus - First record.

Gobius couchi Miller & El-Tawil, 1974, *Gobius fallax* Sarato, 1889, and *Odondebuenia balearica* (Pellegrin & Fage, 1907) are gobiid species, each known to date in the Mediterranean from its northern areas. *G. couchi* was originally described in the north-eastern Atlantic. It was recorded later in the western Mediterranean and the Adriatic Sea (Kovačić, 2001). *G. fallax* and *O. balearica* are known so far from the western Mediterranean, the Adriatic Sea and the Aegean Sea (Miller, 1986; Ahnelt *et al.*, 1994). Specimens from Cyprus, recently found in the Fish Collection of the Hebrew University of Jerusalem, represent the first records of these species in the Levant and extend the known distribution areas of these species to the warmer part of the Mediterranean Sea (Fig. 1).

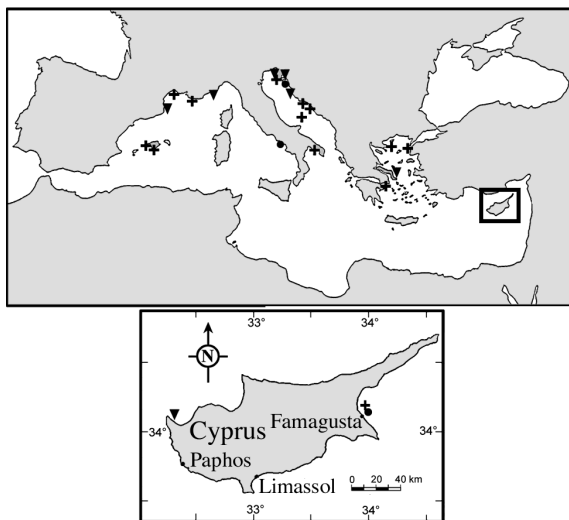


Figure 1. - Map of the Mediterranean showing previous records and showing new records of (●) *Gobius couchi*, (▼) *Gobius fallax* and (+) *Odondebuenia balearica* in Cyprus. [Carte de la Méditerranée montrant les signalements précédents et indiquant les nouveaux pour Chypre.]

MATERIALS AND METHODS

The examined material is deposited in the Hebrew University of Jerusalem (HUJ). Morphometric and meristic methods follow Miller (1988). Meristic abbreviations: A, anal fin; C, caudal fin; D1, D2, first and second dorsal fins; P, pectoral fin; V, pelvic disc; LL, scales in lateral series; TR, scales in transverse series. Terminology of lateral-line system follows Sanzo (1911) and Miller (1986). The specimens identified as *G. couchi* and *G. fallax* possessed the characters described in Kovačić and Miller (2000) that distinguish the genus *Gobius* from other gobiid genera. The characters used for the identification of *Gobius fallax* were obtained from Herler *et al.* (2005), and from specimens from the Adriatic Sea deposited at the Prirodoslovni muzej Rijeka (PMR): *G. fallax*, 4 specimens, PMR VP791; *G. auratus* (colour morph 2 according to Herler *et al.*, 2005), 3 specimens, PMR VP668.

RESULTS

Gobius couchi

Material examined. - 6 females, 29.0 + 5.4 mm to 42.0 + 8.2 mm and 2 males, 31.1 + 5.7 mm and 33.3 + 7.8 mm, HUJ 19404, collected 1.5 km from land in triangle dredge at 20 m depth, Salamis, Cyprus, 23 Oct. 1968 (Fig. 2).

Diagnosis. - (1) suborbital row *d* divided; (2) LL 38-43; (3) anterior membrane height in midline at least 1/4 length of V spinous ray; (4) P 16-18; and (5) anterior nostril with triangular lappet.

Description. - Anterior nostril with triangular lappet. Fins: D1 VI, D2 I/12-13 (12:3, 13:5), A I/11-13 (11:1, 12:6, 13:1), C 16-17 articulated rays (16:4, 17:4), 14-15 branched (14:2, 15:5, 1 specimen with damaged C), P 16-18 (both sides: 16: 7, 17: 7, 18: 2), V I/5+5/I. P free rays moderately developed. V emarginate (84.5-96.9%, 89.5 ± 4.4). Anterior membrane height in midline 27.3-45.0% (32.1 ± 6.8) length of V spinous ray. C rounded. Body mostly with ctenoid scales, LL 38-43 (both sides: 38: 4, 39: 3, 40: 1, 41: 6, 42: 1, 43: 1), TR 11-12 (both sides: 11: 8, 12: 8). Cycloid scales on breast, opercle (only the largest specimen with scales on opercle), nape including predorsal area. Cheek naked. Preserved specimens were light brown. The most distinct pattern was 8-9 darker blotches along lateral midline. Head similar to body, 2 spots on cheek, 3-4 geniohyoid spots, all ill defined. P with dark mark in upper fin origin, deeper than long; rows of dots on the D1, D2 and C; A pigmented. Head with anterior and posterior oculoscapular, and preopercular canals, with pores σ , λ , κ , ω , α , β , ρ , ρ^1 , ρ^2 , and γ , δ , ε respectively. Rows: six transverse suborbital rows (1-6) of sensory papillae; rows 2 and 3 begin more distant from orbit than row 4; suborbital row *di* with 1 or 2 papillae below level of row *d*. Longitudinal row *b* extending forwards to row 5. Longitudinal row *d* variably divided: only below suborbital row 3 (6 specimens);

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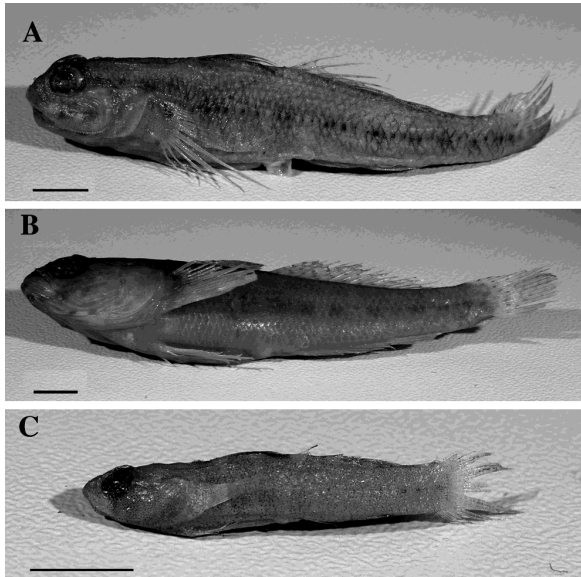


Figure 2. - **A:** *Gobioides couchi*, female, 42.0 + 8.2 mm, HJ 19404, Salamis, Cyprus, 23 Oct. 1968; **B:** *Gobioides fallax*, female, 48.7 + 9.0 mm, HJ 8716, Khrysokhou, Cyprus, 19 Oct. 1969; **C:** *Odondebuenia balearica*, male, 16.9 + 4.3 mm, HJ 8703, Salamis, Cyprus, 23 Oct. 1968. Scale bars = 5 mm.

below suborbital row 3 and with supralabial and horizontal part overlapped (1 specimen); and in supralabial and horizontal parts below suborbital row 2 and in two horizontal parts below suborbital row 3 (1 specimen). Oculoscaphar anterior longitudinal row x_1 ending anteriorly above beginning of row z . Anterior dorsal row g ending behind lateral part of row o , row o separated from fellow in dorsal midline.

Gobioides fallax

Material examined. - 1 female, 48.7 + 9.0 mm, HJ 8716, Khrysokhou Bay, east of Baths of Aphrodite, Cyprus, 19 Oct. 1969 (Fig. 2).

Diagnosis. - (1) suborbital row d divided; (2) LL 45; (3) anterior membrane height in midline no more than 1/5 length of V spinous ray; (4) preserved specimens with blotches along lateral midline, (5) V no more than 1/6 emarginate, (6) P 18-19, and (7) A 1/12.

Description. - Anterior nostril with triangular lappet. Fins: D1 VI, D2 I/14, A I/12, C 17 articulated rays, 14 branched, P left 18 and right 19, V I/5+5/I. Development of P free rays unknown because P uppermost rays damaged. V emarginate, (the shortest branches of V5 compared to the longest branches of V4: 85%), anterior membrane height in midline 18% length of V spinous ray. C rounded. Body mostly with ctenoid scales, LL 45 on both sides, TR 12. Cycloid scales on breast, opercle, nape including predorsal area. Cheek naked. Preserved specimen was yellowish brown. The most distinct pattern was 10 darker blotches along lateral midline; head mottled brown; 5 ill defined geniohyoid spots, P with dark mark in upper fin origin, deeper than long; rows of dots on the D1, D2 and C. Head with anterior and posterior oculoscaphar, and preopercular canals, with pores σ , λ , κ , ω , α , β , ρ , ρ^1 , ρ^2 , and γ , δ , ϵ respectively. Rows: six transverse suborbital rows (1-6) of sensory papillae; rows 2 and 3 begin more distant from orbit than row 4; suborbital row $6i$ descending to the level of row d . Longitudinal row b extending forward through row 5. Longitudinal row d divid-

ed in supralabial and horizontal parts below suborbital row 2 and in two horizontal parts below suborbital row 3. Oculoscaphar anterior longitudinal row x_1 ending anteriorly closer to beginning of row z , than to pore β . Anterior dorsal row g ending behind lateral part of row o , row o separated from fellow in dorsal midline.

Odondebuenia balearica

Material examined. - 1 female, 15.7 + 3.8 mm and 1 male, 16.9 + 4.3 mm, HJ 8703, collected 1.5 km from land in triangle dredge at 20 m depth, Salamis, Cyprus, 23 Oct. 1968 (Fig. 2).

Diagnosis. - (1) suborbital papillae without longitudinal row a ; (2) posterior oculoscaphar canal absent; (3) V fins separate; (4) scales on base of caudal fin with elongate ctenii greatly enlarged; and (5) suborbital papillae in 3 transverse rows before longitudinal row b .

Description. - Anterior nostril tubular without process from rear rim. Branchiostegal membrane attached to entire side of isthmus. Fins: D1 VI, D2 I/9-I/10, A I/9, C 14-15 articulated rays, 13-14 branched, P 15-16 (both sides: 15: 3, 16: 1), V I/5+I/5. Damage of C on male specimen didn't influence the counting. The first spine of D1 the longest; C rounded; P uppermost rays not free from membrane; V separate. Body with ctenoid scales, LL 27-28 (both sides: 27: 1, 28: 3), TR 7-8 (both sides: 7: 3, 8: 1). Head and predorsal area naked. Breast scaled posteriorly. Uppermost and lowermost scales on base of caudal fin with elongate ctenii (each specimen lacks one of four caudal scales). Preserved specimens were fawn, with coarse reticulation of brown dots, more numerous on head, several broad vertical bands poorly visible on male. D1, D2, C and A also rarely pigmented. Head lateral-line system with anterior oculoscaphar and preopercular canals, carrying pores σ , λ , κ , ω , α , β , ρ and γ , δ , ϵ respectively. Rows: no suborbital row a . Five transverse suborbital rows of sensory papillae and a single papilla near pore α . Longitudinal row b extending forwards to row 4. Longitudinal row d continuous, ending posteriorly at row 4. Oculoscaphar row x^1 ending anteriorly above beginning of row z . Anterior dorsal row g ending behind lateral part of row o , row o separated from fellow in dorsal midline.

DISCUSSION

Positive diagnosis based on morphological characters does not exist for *G. auratus*, *G. fallax* and *G. xanthocephalus* as part of the *G. auratus* species group. Herler *et al.* (2005) provided morphological characters that differentiate between these species in median and average values, but the ranges are overlapping. Therefore these meristic and morphometric data guarantee only the identification of the populations, but not the identification of every individual specimen. The only identification criteria for all individual specimens of these species remain ecological and coloration features (Herler *et al.*, 2005). However, the present specimen of *G. fallax* differs from *G. xanthocephalus* by coloration, P and A count, and from *G. auratus* by coloration and V shape (Herler *et al.*, 2005).

The recent findings in the Hebrew University of Jerusalem Fish Collection (Kovačić and Golani, 2006; present paper) increase the known Levantine gobiid fauna by 17%, a total of 23 gobiid species being recorded for this area previously (Golani, 1996). The European parts of the Mediterranean show much higher diversity of this group compared to its southern coasts. In the Adriatic Sea 46 gobiid species are recorded to date, out of the 59 species known in the Mediterranean (Kovačić, 2005). The increase of known gobiid diversity of the Levant, due to the present records, strongly suggests that the low number of species in the Levant results from the

relatively limited work on gobies, and not a real low biodiversity of Gobiidae in the southern Mediterranean. Half of the Levantine gobiid species (12 out of 24 native species) occur also in the Atlantic (Miller, 1986). Therefore, salinity and temperature in this area do not seem a restriction for southern ranges of Mediterranean and Atlantic gobies. The real biodiversity of gobies of the Levant would probably be mostly influenced by substrate types and diversity.

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